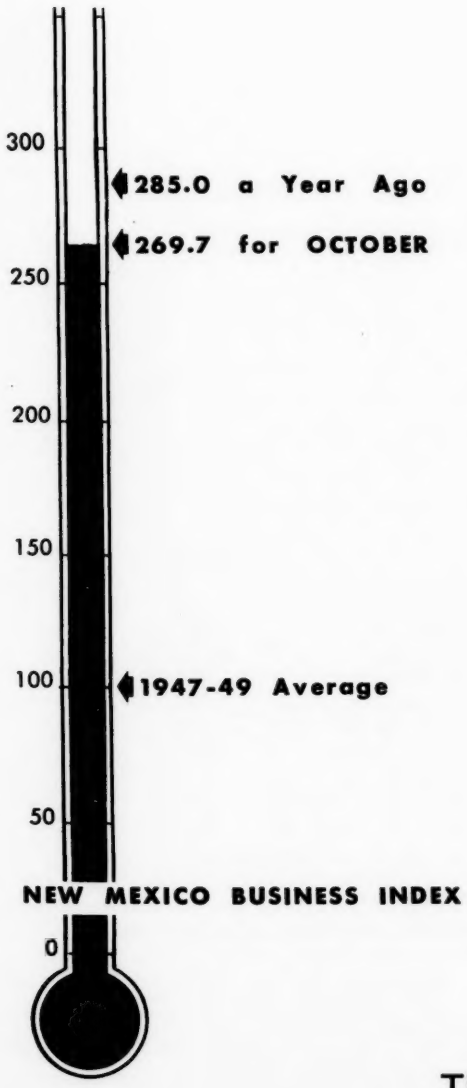
DECEMBER 1960

New Mexico BUSINESS



The New Mexico economic scene in October was more than a trifle gray. The Index of Business Activity hit a new low for the year, pushed down chiefly by a 7-per cent drop in the level of the index of building permits issued by 18 cities (to a point 20 per cent under that in January), a drop of 6 per cent in the index of electric power production to its next-to-the-lowest 1960 resting place, and the smallest manufacturing employment of the year. Life insurance sales also fell off nearly 6 per cent from September sales and 14 per cent from the year's highest point so far, reached in June.

When 10-month averages for 1960 are computed (nine-month averages for sales), we learn that the average Index of Business Activity by the end of October was 280.2, compared with 285.5 in 1959. Also, 26 of our 52 economic measures indicated less economic strength this year than last.

These discouraging measures included sales indexes--total retail, sales by apparel stores, by auto dealers, by furniture and appliance stores, by building materials dealers, and by public utilities and carriers; banking

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The History of N.M. Zinc Mining

Business Activity in New Mexico

	October 1960	Year Earlier October 1959	Per Cent Change October 1960 from Sept. 1960	Per Cent Change October 1960 from Oct. 1959	INDEX October 1960 (Average Month 1947-49 = 100)
Index of Business Activity (1947-49 = 100)	269.7	285.0	- 2.2	- 5.4	269.7
Sales data: Not available. See March 1959 issue of NEW MEXICO BUSINESS					
*Life Insurance Sales (1,000s)	$ 22,454	$ 23,732	- 5.5	- 5.4	640.3
*Bank Debits, 35 banks (1,000s)	489,126	520,618	0.0	- 6.0	305.4[a]
Bank Loans and Discounts, 35 banks (1,000s)	44,928	45,907	- 2.0	- 2.1	266.0[a]
Demand Deposits, 35 banks (1,000s)	341,364	345,759	+ 3.1	- 1.3	183.1[a]
Time Deposits, 35 banks (1,000s)	144,337	125,495	+ 2.0	+ 15.0	407.6[a]
Business Failure Liabilities (1,000s)[b]	193	58	- 43.5	+ 235.2	673.4
Wage Workers in Nonagricultural Establishments	239,400	234,800	- 0.2	+ 2.0	181.7
in Mining	20,100	18,800	- 1.5	+ 6.9	161.2
in Contract Construction	19,800	20,200	+ 0.5	- 2.0	156.7
*in Manufacturing	15,700	16,900	- 1.3	- 7.1	170.0
in Transportation and Utilities	20,700	20,700	+ 1.0	0.0	136.2
in Trade	49,900	49,600	- 2.0	+ 0.6	172.1
in Finance, Insurance, and Real Estate	9,400	9,500	- 1.1	- 1.1	324.1
in Services and Miscellaneous	38,000	36,900	- 0.8	+ 3.0	174.6
in Government	65,800	62,200	+ 1.5	+ 5.8	230.6
Number of Insured Unemployed	5,447	3,870	+ 6.3	+ 40.7	--
Rate of Unemployment (per cent of labor force)	2.87	2.07	+ 7.5	+ 38.6	184.7
Construction Contracts Awarded (value in 1,000s)	$ 18,424	$ 20,370	+ 14.5	- 9.6	--
Residential (value in 1,000s)	$ 5,854	$ 8,679	- 14.4	- 31.4	--
Number of Permits	498	715	- 6.7	- 30.3	--
Floor Area (1,000 sq ft)	562	822	- 13.9	- 31.6	--
Nonresidential (value in 1,000s)	$ 3,538	$ 9,060	- 36.5	- 60.9	--
Floor Area (1,000 sq ft)	249	421	- 46.7	- 40.9	--
Heavy Engineering (value in 1,000s)	$ 8,932	$ 2,631	+150.9	+ 239.5	--
*Petroleum Production (1,000s of bbls)	8,870	8,828	+ 2.0	+ 0.5	233.9
Natural Gas Production (millions of cu ft)	67,434	60,495	+ 11.1	+ 11.5	419.2
*Electric Power Production (1,000s of kwhs)	267,977	265,425	- 6.2	+ 1.0	303.7
*Index of Total Metallics Production (1947-49 = 100)	76.2	16.4	+ 1.8	+ 363.7	76.2
Mine Production - Copper (1,000s of lbs)	10,958	242	+ 3.0	+4,428.1	103.7
Mine Production - Lead (1,000s of lbs)	310	410	+ 5.4	- 24.4	29.9
Mine Production - Zinc (1,000s of lbs)	2,064	2,228	- 12.5	- 7.4	32.3
*Mine Production - Potash (1,000s of tons)	1,332	1,171	+ 3.1	+ 13.8	332.8
Index of All Farm Prices (1947-49 = 100)	95.2	106.2	+ 2.3	- 10.4	95.2
Index of Livestock Prices	100.3	113.4	+ 2.3	- 11.6	100.3
Index of Crop Prices	89.3	95.6	+ 1.8	- 6.6	89.3
Receipts from All Farm Marketings (1,000s)	$ 58,668	$ 68,371	+ 44.7	- 14.2	130.5
Livestock and Products	46,033	50,381	+ 33.2	- 8.6	142.9
Crops	12,635	17,990	+ 49.2	- 29.7	98.8

	November 1960	Year Earlier November 1959	Per Cent Change November 1960 from Oct. 1960	Per Cent Change November 1960 from Nov. 1959	INDEX November 1960 (Average Month 1947-49 = 100)
Bank Debits, 35 banks (1,000s)	$514,292	$508,249	+ 5.1	+ 1.2	321.0[a]
Bank Loans and Discounts, 35 banks (1,000s)	48,877	51,434	+ 8.8	- 5.0	289.4[a]
Demand Deposits, 35 banks (1,000s)	343,020	359,409	+ 0.5	- 4.6	184.0[a]
Time Deposits, 35 banks (1,000s)	146,526	128,884	+ 1.5	+ 13.7	413.7[a]
Wage Workers in Nonagricultural Establishments	238,800	234,500	- 0.3	+ 1.8	181.3
Number of Insured Unemployed	6,717	4,862	+ 23.3	+ 38.2	--
Rate of Unemployment (per cent of labor force)	3.52	2.59	+ 22.6	+ 35.9	226.4
*Building Permits, total 18 cities (1,000s)	$ 7,344	$ 6,480	+ 44.1	+ 13.4	255.4[a]
Residential	3,423	4,142	+ 24.0	- 17.4	191.9[a]
Nonresidential	2,953	1,610	+ 93.2	+ 83.5	404.7[a]
Other	968	728	+ 19.7	+ 33.0	266.8[a]
Index of All Farm Prices (1947-49 = 100)	95.9	102.4	+ 0.7	- 6.3	95.9
Index of Livestock Prices	101.3	108.7	+ 1.0	- 6.8	101.3
Index of Crop Prices	89.7	94.4	+ 0.4	- 5.0	89.7

*Indexes for these items are used to compute the Index of Business Activity.
[a]Although the number of reporting units changes, the indexes for these items are comparable with indexes for preceding months.
[b]The figures in this series are based on the average of three months' data.

Sources:
Retail Sales Data: N. M. Bureau of Revenue
Potash Production: N. M. Bureau of Revenue
Petroleum and Natural Gas Production: N. M. Oil Conservation Commission
Life Insurance Sales (New Ordinary): Life Insurance Agency Management Association
Wage Workers and Unemployment: N. M. Employment Security Commission and U.S. Department of Labor
Electric Power Production: Federal Power Commission
Metallics Production: U.S. Bureau of Mines
Farm Prices and Marketings: U.S. Agricultural Marketing Service
Bank Data (all series) and Building Permits: Bureau of Business Research
Business Failure Liabilities: Dun & Bradstreet, Inc.
Construction Contracts: F. W. Dodge Corporation

Zinc in New Mexico

By

ALVIN J. THOMPSON

Director, **STATE BUREAU OF MINES AND MINERAL RESOURCES**

Zinc ranks fourth in tonnage among the metals produced in the United States, being outranked only by steel, aluminum, and copper. The metal is indispensable to the industrial strength of the United States, both in peace and in war. It is used in the production of an extremely wide range of military and essential civilian goods. Wartime requirements include cartridge brass, copper-alloy castings used in shipyards and munition factories, hull plates to protect steel hulls from corrosion, and zinc-coated products with innumerable uses. Zinc oxide is an important constituent of the rubber used in the tires of Army vehicles and in gas masks. Chemical derivatives of zinc are employed in paints, bleaches, and other essential products. The major civilian uses of zinc overlap the military uses, particularly in the case of galvanized products and die castings.

Sources of Supply

The United States gets its zinc from many domestic and foreign sources. In recent years the supply from these sources has been in about a 1-to-1 ratio. Zinc deposits are distributed widely throughout the world, particularly favorable reserves being found in Australia, Eastern Europe, the United States, Canada, Peru, and Argentina. At the present time Australia appears to have by an appreciable margin the largest zinc reserves of any nation.

The United States for many years has been the largest zinc-producing country in the world and annually has produced about one quarter of the total world output. The leading zinc-bearing districts in the United States are the Tri-State (in Missouri, Kansas, and Oklahoma); Coeur d'Alene, Idaho; Franklin, New Jersey; Butte, Montana; St. Lawrence County, New York; Eastern Tennessee; Central, New Mexico; Bingham, Utah; Pioche, Nevada; Red Cliff, Colorado; and Austinville, Virginia.

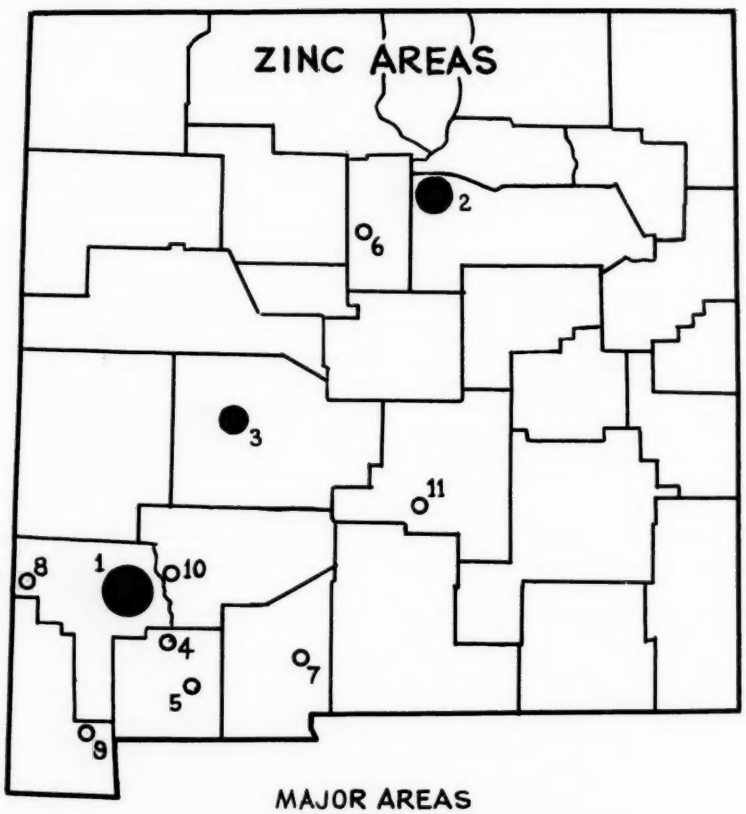
EARLY ZINC MINING ACTIVITIES

Records indicate that the first mining of zinc ore in New Mexico began in the early 1890s, about 90 years after the first commercial production of copper. This early production came from deposits in Grant county, east of Silver City. Although these deposits of zinc in Grant county had been known for many years, it was not until the Atchison, Topeka & Santa Fe Railway reached the area in 1891 that it became economically feasible to consider the development of zinc mines. Production proceeded slowly at first and remained relatively small until 1910. In 1910 the production of 1,285,500 pounds was probably in excess of that of all the years prior to that time.

Chief Zinc Area and Companies

By 1960 this region east of Silver City, known worldwide as the Central Area, had produced close to a billion and a half pounds of zinc. The deposits in a general way surround the big copper mine of the Kennecott Copper Corporation. Kennecott itself was, for a time, an important zinc

Figure 1



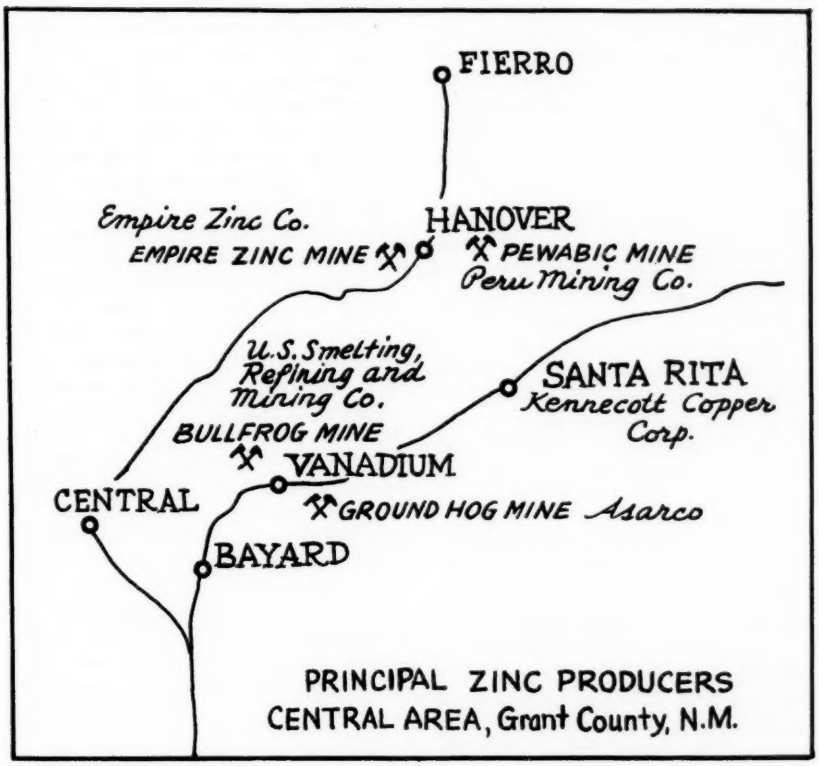
MAJOR AREAS

1. Central area, Grant County
2. Pecos mine, San Miguel County
3. Magdalena, Socorro County

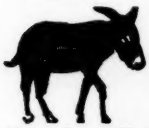
MINOR AREAS

4. Cook's Peak, Luna County
5. Tres Hermanas and Florida Mts. Luna County
6. Cerrillos, Santa Fe County
7. Organ Mts., Dona Ana County
8. Steeple Rock, Grant County
9. Hachita, Hidalgo County
10. Kingston, Sierra County
11. Nogal district, Lincoln County

Figure 2



producer; in 1946 that company became the fourth largest producer of zinc in the State, and in 1947 it ranked second, with a combined output for the two years of 30 million pounds of zinc.



In terms of length of operation, as well as of total production, the Empire Zinc Company, a subsidiary of the New Jersey Zinc Company, is the zinc titan of this state. The Empire Zinc mines at Hanover have been in nearly continuous operation since 1902 except for several periods when the demand for zinc was low. The mines at Hanover were distinctive in another way. For about 30 years, beginning in the early 1920s, mules served as the power source for all underground haulage. In spite of stiff competition from newly developed trolley systems and battery locomotives, the mules held tenaciously to their jobs. The management claimed the following advantages for their hay-burning power plant: mules were not nearly so costly as battery locomotives; they were mobile, able to maintain practically a constant speed through a trip; and they eliminated the danger of shock (electrical shock, that is). On the other hand, it was conceded that the electric motor was not as temperamental as the mule and that recharging a mule required expensive hay and grain compared with cheap electricity for the motor battery. Moreover, the high intelligence of mules often served to frustrate an operator. Oldtimers relate how one mule would look back at his train and if it had one car above his quota he would not budge an inch, or how mules near the end of a shift would use their own judgment as to the time to quit and would turn off for home when they passed the tunnel exit opening.

Besides the Empire Zinc Company, important producers of zinc in the Silver City area have been the Peru Mining Company, the U. S. Smelting, Refining & Mining Company, and the American Smelting & Refining Company.

In 1927 the Peru Mining Company, a subsidiary of the Illinois Zinc Company, acquired a group of claims located about a half mile east of the town of Hanover. These holdings have been known as the Pewabic group. Since 1928 the Pewabic mine has been one of the most important zinc producers in the State. Its total production is estimated at around 400 million pounds of zinc valued at $25 million to $30 million. For the most part, zinc has been the only metal produced by the Pewabic mine, as compared with other zinc mines in the State, which usually yield substantial amounts of lead as well.

The United States Smelting, Refining & Mining Company has holdings covering a belt roughly one mile wide by 10 miles long, extending throughout the length of the Bayard and the Hanover areas, from the village of Bayard on the south to a point three miles northeast of the town of Fierro. Although the greater part of the holdings is in the Hanover area, the bulk of the production has come from the Bullfrog mine in the Bayard area, which is located about a mile northwest of the Ground Hog workings of the American Smelting & Refining Company.

The Bullfrog, which was first known as the Owl mine, was worked on a small scale prior to 1905, but remained idle from 1905 until taken over by U.S. Smelting, Refining & Mining in 1940, along with other nearby prospects. After a period of exploration, in March 1943 this company began mining the blocked-out ore. The ore is milled in a 600-ton differential mill, originally built as a 250-ton concentrator. This plant, located on the company property, was put in operation in March 1943. Zinc and lead have been the chief metals produced, with minor amounts of copper, silver, and gold. The company was the leading supplier of zinc in the State for a number of years during the 1940s and 1950s. Its total zinc production has probably amounted to several hundred million pounds.

Since 1928, Asarco, a subsidiary of the American Smelting & Refining Company, has operated mines in an area about one-half mile southeast of the town of Vanadium, in Grant county. This operation, which usually is referred to as the Ground Hog mine, was the leading producer of zinc in New Mexico during 1955 and 1956. Although the mine has yielded a considerable amount of lead and copper in addition to zinc, from the standpoint of tonnage zinc has been the most important metal mined.

In addition to Grant county two other counties in New Mexico have been important producers of zinc: Socorro in the central part of the State and San Miguel in the north-central part.

Although the first recorded production of zinc in New Mexico was in Grant county in the early 1890s, the mining of this metal in quantity did not begin in this State until the realization in 1903 and 1904 that massive deposits of zinc carbonate, an oxidized zinc ore found in Magdalena, Socorro county, were valuable for use in paint manufacture. For many years prior to 1900 the mines in the Magdalena area had been important producers of gold, silver, and lead. These were the only metals of particular interest to the miner in this early period. Large quantities of zinc carbonate, whether recognized or not, had been removed as waste and thrown over the dump. With the discovery in 1903 of an especially rich shoot of zinc carbonate ore, an attempt was made to find a market for this product. Samples were taken to the Joplin, Missouri, smelter; it was shown that this material was suitable for the manufacture of zinc pigment, and large bodies of zinc carbonate ore began to be worked in the two important mines of the Magdalena area, the Kelly and the Graphic mines. In 1904 the Sherwin Williams Paint Company purchased the Graphic mine and organized a mining subsidiary, Ozark Smelting & Mining, to operate it. Both the Graphic and the Waldo mines of the Ozark company have been major producers of zinc ore in the area. In 1943 American Smelting & Refining purchased the Ozark properties, including the Waldo mine and a 250-ton selective flotation mill, and operated them continuously until June 1949. Production was high throughout the period of World War II.

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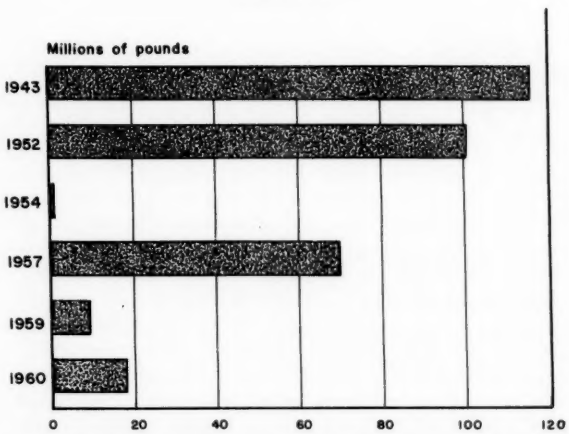
Figure 3

Zinc Production in New Mexico

1943 - 1960



Output in 1943 far surpassed that in any succeeding year. In 1954, production almost vanished.

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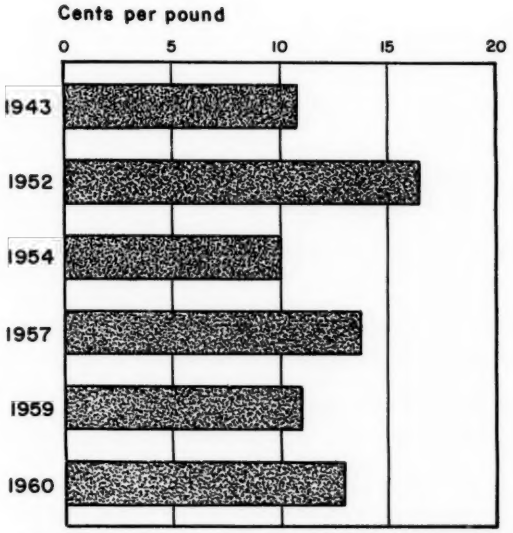
Figure 4

Zinc Prices

1943 - 1960



Zinc prices improved somewhat in 1960, but still fell noticeably short of the 1952 high.

The Kelly mine was purchased by the Empire Zinc Company in 1913. Ore from the Kelly, Lynchburg, and other properties of this company have added substantially to the zinc output of the district.

From 1903 to 1930 zinc was by far the main metal produced in the Magdalena district, and nearly half of the zinc produced in the State came from this district. About $16 million worth of zinc ore was mined and shipped from Magdalena during the period from 1903 to 1930. In the earlier part of these years the zinc carbonates, smithsonite, constituted most of the production.

The mining of zinc carbonate soon gave way to the production of the sulfide mineral sphalerite; and this mineral has been by far the chief zinc mineral mined in Magdalena, as well as in the other districts in New Mexico. Some of the smithsonite found in Magdalena in the early days, and since, became famous as mineral specimens. The presence of a small amount of copper in this material gave it an unusually attractive green or greenish-blue shade, so that, whether polished or unpolished, it was highly prized as a semigem stone.

Since 1930 the mining of zinc in the Magdalena area has followed the pattern of other zinc camps in the West. In times of relatively high zinc prices output has been high, and in times of depressed prices the output has been low. The total production of the area up to the present time is estimated at 321 million pounds of zinc.

Other Zinc Counties

From the standpoint of the total amount of metal produced, San Miguel ranks next to Grant as the most important zinc-producing county. The entire production of zinc from San Miguel county came from one mine and was produced during a short period of 12 years of intensive operation. At the junction of Willow Creek and the Pecos River is a copper-stained silicified outcrop that had been known since 1878. A number of mining locations had been made on the deposit, and a considerable amount of development work had been performed. The high-grade zinc and lead ore that was revealed under the outcropping proved, however, to be refractory to normal concentration procedure, and it was not until the 1920s that a satisfactory operation on this deposit seemed assured. The American Metals Company took over the management of the property in 1925 and built a 600-ton flotation mill to treat the mine ore. The mill began operation in January 1927 and operated continuously from the time it was first set in motion, except for normal shutdowns for repairs, until its final closing in May 1939.

The records indicate that the Pecos mine, as the American Metals operation at the Pecos River and Willow Creek junction is generally known, treated a total of 2,299,082 dry tons of ore, containing 243,474 ounces of gold, 7,748,006 ounces of silver, 185,514,389 pounds of lead, 35,835,807 pounds of copper, and 595,355,840 pounds of zinc. The reported recovery of zinc in the milling operation was 504,824,696 pounds. It is interesting to note that the Pecos mine operated throughout the depression years, when the price of zinc reached the 20th-century-low figure of 2.9 cents a pound and the average price probably was less than 5 cents.

Although the three counties of Grant, Socorro, and San Miguel have been by far our chief zinc-producing counties, there have been periods when other counties have made significant contributions to the total. Table I lists by counties New Mexico zinc production during the last 56 years.

The total production of zinc in New Mexico, amounting to about 2,500 million pounds with a value of $223 million, places zinc as the sixth most important mineral commodity the State has produced to date. In total value of production, zinc is exceeded only by petroleum products, potash, copper, uranium, and coal.

TABLE I

ZINC PRODUCTION IN NEW MEXICO
1904-1960

County	Production (in pounds)
Grant	1,643,467,200
San Miguel	595,355,840
Socorro	321,139,811
Luna	9,066,992
Santa Fe	5,962,682
Dona Ana	1,693,521
Hidalgo	1,138,100
Sierra	626,237
Lincoln	16,000

RECENT ZINC MINING ACTIVITIES

The last decade has seen periods of extremes in zinc production. In 1952, when the average price of zinc was 16.5 cents a pound, the value of the metal produced reached an all-time high of $16,923,700. In 1954, two years after this record year, production fell to the lowest point reached since the State became an important zinc producer in 1903. All the zinc mines in New Mexico were closed in 1954, the small quantity of the metal still produced being derived as a byproduct from three small lead mines in Grant and Socorro counties. A remarkable revival of zinc mining activity began in mid-1955; and in 1956 nearly $10 million worth of zinc was produced, giving another year of unusually high production. A second period of depressed mining activity followed, when the price of zinc metal dropped to 10 cents a pound in July 1957. In 1958 and 1959 the amount of zinc ore mined dropped to the lowest level in 30 years, except for 1954, giving this State a second extreme low for the decade. Table II shows the amount and value of zinc production for selected years, together with figures on the number of men employed in the industry during those years.

TABLE II

ZINC PRODUCTION STATISTICS FOR SEVERAL SELECTED YEARS
New Mexico, 1943, 1952, 1954, 1957, 1959, & 1960*

Year	Zinc Production (pounds)	Value	Men Employed	Zinc Price (cents/lb)
1943	119,048,000	$12,750,000	1,000	10.8**
1952	101,950,000	16,900,000	930	16.5
1954	28,000	2,800	--	10.0
1957	70,020,000	9,592,740	620	13.7
1959	9,272,000	1,070,000	90	11.0
1960*	18,000,000	2,400,000	200	13.0

*Projected estimate
**Includes production bonus paid during World War II.

Zinc mining is limited now to one mine each in three scattered areas: the Hanover mine of Empire Zinc in Grant county; the Lynchburg mine of Empire Zinc near Magdalena, Socorro county; and the American mine of the Gibraltar Minerals Company near Hachita, Hidalgo county, where only a small tonnage is mined. The Peru Mining Company is reported to be conducting an intensive exploration and development program at its Kearney mine in anticipation of future production. Other mines in the industry are on a more or less standby basis. The current zinc price of 13 cents a pound is near the present "break-even" point for most operators. If the zinc price were to rise to 15 cents or better and have the assurance of remaining there, most of the zinc mines would reopen. On the other hand, if the zinc price were to drop, even to 12 cents a pound, it probably would cause the closing of the few mines that now are active. (Editor's Note: Late in December the price at East St. Louis dropped to 12 cents and that at New York to 12 1/2 cents.)

As shown in Table II, the estimated production of zinc for 1960 with about 200 men employed is

almost double that of 1959. Table II also illustrates the fact that New Mexico can furnish 100 million or more pounds of zinc yearly and employ nearly 1,000 persons under favorable market conditions. When and if the zinc price rises to a suitable level, the State can again be counted on to produce a substantial amount of this metal.

THE FUTURE AND ECONOMICS OF ZINC IN NEW MEXICO

The future of zinc in New Mexico will depend upon a number of factors, one of which is the ability of the mines in this state to compete with zinc mines elsewhere in the United States and in other countries. Although figures on the reserves of zinc in New Mexico are not readily obtainable, the evidence indicates that important reserves of zinc still remain, entirely apart from the possibilities of new discoveries, the prospects of which seem bright in certain areas. From the standpoint of supply, New Mexico is in a good position to be an important producer of zinc for many years to come.

Future Demand

Another important factor bearing on zinc mining activities in New Mexico is the future demand for the metal. This is the main factor upon which the price structure depends. Zinc has carved out special niches for itself in two modern applications that together now account for about three fourths of the total consumption of the metal. One of these is the use of zinc to coat steel to help withstand corrosion. Such zinc-coated steel, called galvanized steel, has long been used as sheeting for agricultural buildings, roofing, highway culverts, and air-conditioning equipment, and in tubes and piping in pipeline construction. Millions of tons of steel products are given protection each year with coatings of zinc around a thousandth of an inch in thickness. The other important outlet for zinc has been its use in die casting. Die casting is the process of producing dimensionally accurate parts by forcing metal under pressure into a polished steel die or mold. The low melting point of zinc makes it particularly suitable for die casting. Because of the complexity of shapes possible, the excellent properties of the parts made by die casting, and the simplicity of the operation, this process is among the most important high-volume production methods in the metal-working industry. Zinc die-cast items, such as door handles, window cranks, horn rings, panel parts, hood ornaments, radiator grilles, fuel pumps, and carburetors, have been used for years in automobile construction. This year the large car manufacturers used approximately 80 pounds of zinc per car in die-cast items. Zinc die castings are used also in electrical appliances, business machines, building hardware, tools, toys, and novelties.

In these two fields, galvanizing and die casting, over which suppliers of zinc have long considered that they had fairly exclusive domain, zinc is now being subjected to strong competition. The field of protective coating of steel has been invaded by aluminum to such an extent that there are now few products made from steel coated with zinc that are not threatened directly by aluminum or by aluminum-coated steel. Although it presently appears that the cost factor will strongly support the use of zinc in most applications, the final outcome is by no means certain. Aluminum, moreover, competes with zinc in certain die-casting applications, and this is of some concern to the zinc industry also.

Any discussion of the use of zinc would be inadequate if mention were not made of the use of zinc in brass, an alloy of zinc and copper containing in most cases approximately one third zinc and two thirds copper. Zinc as a component of brass was known in the ancient civilizations of China and Rome over 2,000 years ago, long before zinc was known as a separate element.

Its use in the manufacture of brass constituted its main or only use for centuries; only in recent years has brass yielded to galvanizing and die casting as the chief consumer of zinc. Although the production of brass has not declined, these other uses of zinc have grown so tremendously in recent years that they have overtaken brass as the principal user of this metal. Of the 920,000 tons of zinc consumed in 1959, only about 120,000 tons, or 13 per cent, were used in the production of brass.

Pattern of Operations

None of the products for which zinc is used are made in the State. For that matter, not even crude zinc is produced in this state, the final product in New Mexico being a mill concentrate, which in most cases contains around 60 per cent zinc. This is shipped to zinc smelting plants in Texas, Oklahoma, or other states for the production of the refined metal. As compared with the production of metallic copper or metallic lead from their concentrates, the smelting of zinc is a relatively expensive operation, and a substantial part of the total cost of producing metallic zinc for use in industry is derived from the treatment of the concentrate to yield the final product. Smelting charges usually will amount to $50 or more for each ton of zinc concentrate treated. Together with the expense of shipping to the smelter, these charges amount to 4 or 5 cents for each pound of refined zinc produced, or about one third of the present market price of 13 cents a pound.

All the zinc that has been mined in New Mexico to date has come from underground mines; and with but few exceptions all zinc mining in the Western Hemisphere is done by underground methods also, in contrast with copper mining, in which 90 per cent or more of the ore in the United States comes from mines that are open to the surface, called open-pit mines. As in the case of copper mining, nearly all the ores of zinc that are mined in New Mexico require milling, because they contain too little zinc to bear the expense of direct smelting or contain lead and copper, which must be separated from it. Milling consists of crushing and grinding the ore until the metallic mineral grains are released and then removing the liberated mineral grains by flotation. In flotation, advantage is taken of the fact that metal-mineral particles tend to cling to small bubbles of air if they are finely ground and agitated in water and air. The attachment of the fine metallic-lustered particles to the air bubbles is enhanced by the addition to the pulp of very small amounts of organic chemicals, which help to impart a water-repellent, air-avid surface to the minerals. The air bubbles, supplied to the ore-and-water mixture by blowing or by the agitation of the mixture, together with the attached mineral particles, rise to the top of the agitated fluids and are skimmed off in a bubbly froth called a flotation concentrate. By flotation the zinc content of the product is raised from a small percentage in the ore to close to 60 per cent in the concentrate. In nearly every case the concentrate produced at zinc mills is composed mostly of sphalerite, a zinc sulfide mineral that, when pure, contains about two thirds zinc and one third sulfur. If copper and lead minerals also are present in the ore, as is usually the case in New Mexico ores, these minerals can be concentrated into separate flotation concentrates by adding other organic chemicals to provide selective coating of water-repellent, air-avid films.

The Outlook

Conflicting trends make it difficult to appraise the outlook for zinc from a utilization standpoint. For instance, the new compact car, accounting for a fourth of our light-auto output, uses only half as much zinc as a conventional car. At the same time, Dr. Schrade F. Raddke, director of Research for the American Zinc Institute, has estimated that by 1965 the domestic auto industry could use an additional 100,000 tons of zinc in the heavily galvanized steel employed in the new unitized body construction of compact cars. Such galvanizing and heavy zinc paints, Dr. Raddke asserts, are the industry's answer to the problem of corrosion. A 23-nation United Nations lead-zinc study group at its meeting in Geneva, Switzerland, a few months ago found that there would be a "statistical" surplus of lead and zinc during 1961. In recent years zinc has been characterized by steadily rising world production and consumption, and the group forecast suggests the continuation of this trend in 1960-61.

In discussing the future of zinc in New Mexico, we must consider the attitude of the state and federal governments toward the minerals industry. Sound tax policies that will provide a favorable climate for prospecting, exploration, development, and production could contribute substantially to this state's mineral economy, of which the zinc industry is an important factor. A committee appointed by the Governor in 1960 to make recommendations on long-range objectives for New Mexico in regard to the mineral industry has given thought to this question. No specific recommendations have been made to date, but a pre-

liminary report pointed out certain possible aids to mineral development that might be provided by the State. Further study of the subject was recommended, and it is probable that definite proposals will be forthcoming in the future.

The problems of distributing the tax burden in this state in the best interests of society are complex and far reaching. Sound tax policy should strive, however, for equality and uniformity and should provide, as nearly as possible, a just and reasonable distribution of the taxation among different classes of taxpayers. The mining industry should bear its fair and equitable share of the tax burden, but it should be the concern of the State to see that excessive burdens are not imposed on any one industry. Legislative bodies tend to devote attention to what an industry can bear in the way of a tax without regard to such long-range considerations as how such taxes might affect the industry's future growth and the overall long-term revenue that could be derived from this source.

The mining industry in New Mexico is especially opposed to the severance tax, a tax imposed on the extractive industries over and above all other taxes to which such industries, in common with other industries, are fully liable. The severance tax has its roots in the notion that minerals taken from the ground are an irreplaceable loss of valuable resources of the State. Viewed in this light, such extraction would be the reverse of conservation. The mining industry objects to the concept that hoarding ore reserves is conservation. When ore is mined, it is usual that more ore is found in the same mine and in the same general area. The mining of ore by a healthy industry stimulates the search for new mines and, if a scarcity of any product is impending, the search for a new product to replace it. The hoarding of any product can easily result in the complete loss of the product's marketability as needs and technology change, or as more important deposits are discovered elsewhere. Deposits of potash ore are now being developed in Canada and Utah of such grade and quantity that it is conceivable that the New Mexico deposits would have remained unused during any practical period of time had the Canadian and Utah industries been developed first. The estimated reserves of Canadian potash alone, lying close to the United States border, are enough to serve this country's entire needs for several thousand years.

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indexes (for 36 banks) for debits, loans and discounts, and demand deposits; index of business-failure liabilities; indexes of employment in contract construction and in manufacturing; the number of insured unemployed (weekly average) and the rate of unemployment (percentage of the labor force); indexes of residential and miscellaneous building permits issued by 18 cities; value of residential, nonresidential, and total construction contracts awarded; and indexes--both of prices and of receipts from marketings--for farm products: total, livestock, and crops.

Preliminary November figures do offer a few rays of hope. Banking measures appear improved, farm prices inched up a trifle, and building permits showed definite strength.

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